Product Overview

This chapter provides an overview of the features and components of the Catalyst 4000 series switches and contains these sections:

- Switch Features, page 1-1
- Switch Components, page 1-12

Switch Features

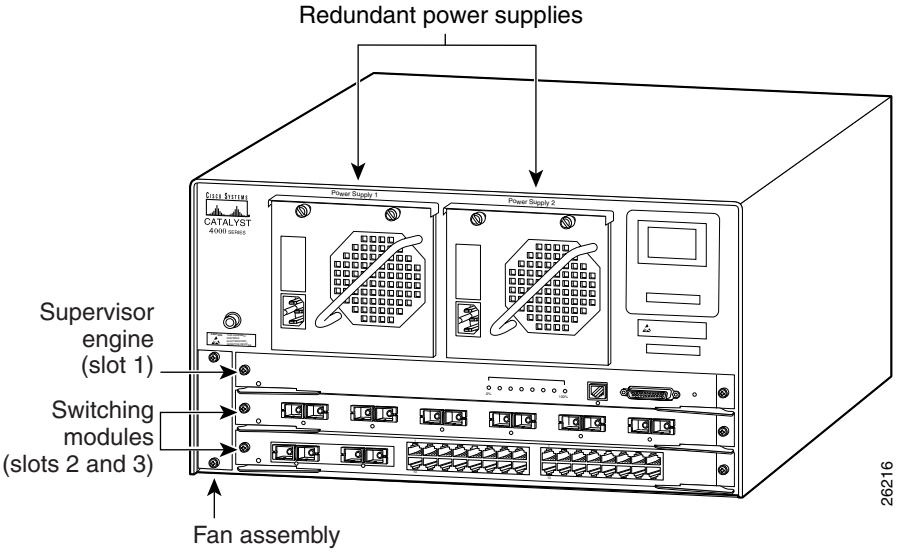
The following sections describe the features of the Catalyst 4000 series switches:

- Catalyst 4003 Switch Features, page 1-1
- Catalyst 4006 Switch Features, page 1-7

Catalyst 4003 Switch Features

The Catalyst 4003 switch (see Figure 1-1) is a three-slot switch designed for high-performance, high-density wiring closet applications.

Figure 1-1 Catalyst 4003 Switch (Front View)



The Catalyst 4003 switch has a Gigabit Ethernet port and a 12-Gbps nonblocking, full-duplex switching fabric that provides connections between the supervisor engine and the switching modules. The Catalyst 4003 switch supports the Supervisor Engine I. The Supervisor Engine I has a 10BASE-T Ethernet management port (RJ-45 connector) and a console port (DCE DB-25 connector).

The Catalyst 4003 chassis has three slots for online-swappable modules. Slot 1 is reserved for the supervisor engine, which provides switching, local and remote management, and switch-status monitoring. Slots 2 and 3 are available for switching modules.

Table 1-1 describes the features of the Catalyst 4003 switch.

Table 1-1 Features of the Catalyst 4003 Switch

Feature	Description
Ethernet speeds	• Ethernet (10BASE-T) interface to workstations and repeaters • Fast Ethernet (100BASE-T) interface to workstations, servers, switches, and routers **Note** Autonegotiation of link speed on each 10/100 port allows migration to 100BASE-T from a 10BASE-T installed base.
Standard equipment	• Three-slot modular chassis with one slot reserved for a supervisor engine and two slots for switching modules • Two power supply bays that support one required and one optional redundant AC-input power supply • One hot-swappable fan assembly
Standard management and support	• Layer 2 forwarding with an aggregate forwarding rate of greater than 17.8 million pps • 16,000 MAC addresses per system • Up to 1,024 VLANs with IEEE 802.1Q VLAN tagging on all ports and support for VTP[1] • Port aggregation using PAgP[2] for 100-Mbps and 1000-Mbps EtherChannel
Software management	• CLI[3] and SNMP interfaces consistent with the Catalyst 6500 series switches • Out-of-band management (SNMP, Telnet client, and TFTP) through the 10BASE-T management port on the supervisor engine • RMON[4] with RMON 1 • Standard Layer 2 features: – 802.1D Spanning Tree Protocol – CDP[5] – VTP version 2 with pruning extensions – CGMP[6] client

Table 1-1 Features of the Catalyst 4003 Switch (continued)

Feature	Description
Embedded management	• Full SNMP implementation, including entity-MIB, all relevant standard MIBs, and all relevant Cisco MIBs • The first four RMON groups (Ethernet statistics, Alarms, Events, and History supported) on a per-port basis without an optional RMON processing module • SPAN, allowing redirection of traffic from any port or VLAN to a SPAN destination port • Performance management information
Power supplies	• One standard 400 W, 12 V output, hot-swappable, load-sharing redundant power supplies with AC power factor correction • Optional 400 W, 12 V output DC power supplies • Optional 650 W, 12 V output DC power supplies • PoE is not supported on the Catalyst 4003
Supervisor engine	• Supports the Supervisor Engine I (WS-X4012) • Data path and control for all network interfaces with Ethernet management and console ports • Interface monitoring, environmental status, and SNMP and console/Telnet interface **Note** Packets are not forwarded while the supervisor engine is removed; a system reboot occurs when a supervisor engine is reinserted. • Gigabit Ethernet (1000BASE-X) interface for backbone interconnection of high-performance switches and routers

Table 1-1 Features of the Catalyst 4003 Switch (continued)

Feature	Description
Supported switching modules	• 24-port Fast Ethernet switching module (WS-X4124-RJ45) • 24-port 100BASE-FX Fast Ethernet switching module (WS-X4124-FX-MT) • 48-port 100BASE-FX Fast Ethernet switching module (WS-X4148-FX-MT) • 48-port 10/100-Mbps Fast Ethernet switching module (WS-X4148-RJ) • 48-port 100BASE-BX10-D Fast Ethernet switching module (WS-X4148-FE-BD-LC) • 48-port 100BASE-LX10 Fast Ethernet switching module (WS-X4148-FE-LX-MT) • 48-port 10/100-Mbps Fast Ethernet switching module (WS-X4148-RJ21) • 48-port Cisco prestandard Power over Ethernet (PoE) 10/100BASE-TX switching module (WS-X4148-RJ45V)[7] • 24-port IEEE 802.3af-compliant PoE 10/100BASE-TX switching module (WS-X4224-RJ45V)[7] • 48-port IEEE 802.3af-compliant PoE 10/100BASE-TX RJ-21 switching module (WS-X4248-RJ21V)[7] • 48-port IEEE 802.3af-compliant PoE 10/100BASE-TX switching module (WS-X4248-RJ45V)[7] • 32-port 10/100-Mbps Fast Ethernet plus 2-port Gigabit Ethernet switching module (WS-X4232-GB-RJ) • 32-port 10/100-Mbps plus 2-port 1000BASE-X Layer 3 Ethernet routing module (WS-X4232-L3) • 32-port 10/100-Mbps Fast Ethernet switching module with modular uplink support (WS-X4232-RJ-XX) – 4-port 100BASE-FX MT-RJ uplink module (WS-X4504-FX-MT) (optional)

Table 1-1 Features of the Catalyst 4003 Switch (continued)

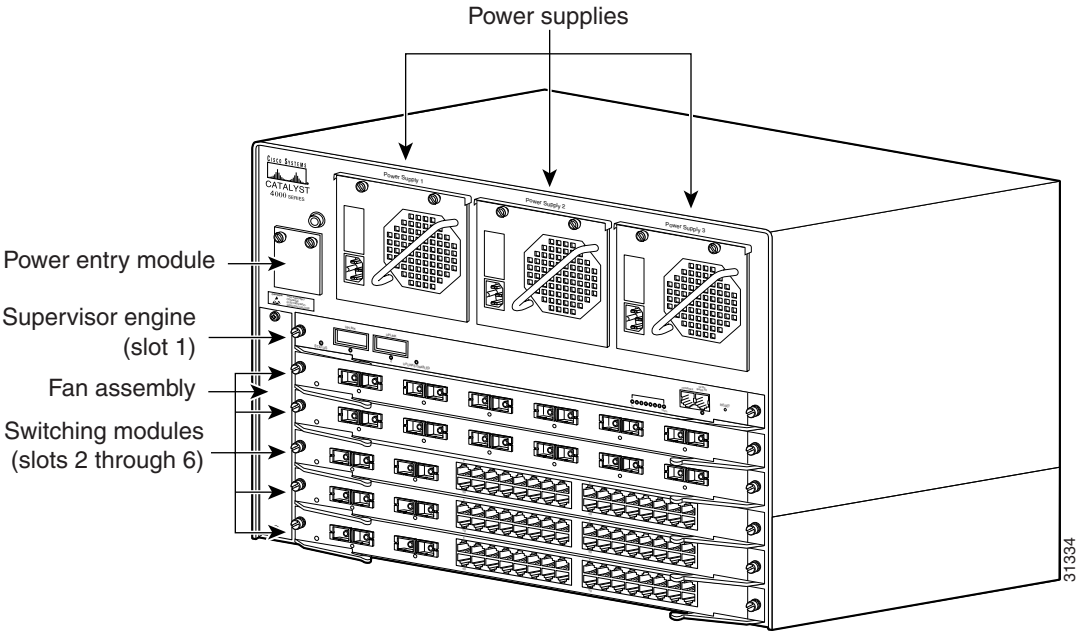
Feature	Description
Supported switching modules (continued)	• 2-port Gigabit Ethernet switching module (WS-X4302-GB) • 6-port 1000BASE-X Gigabit Ethernet switching module (WS-X4306-GB) • 12-port 1000BASE-TX plus 2-port 1000BASE-X Gigabit Ethernet switching module (WS-X4412-2GB-T) • 18-port Gigabit Ethernet switching module (WS-X4418-GB) • 24-port 10/100/1000BASE-T Gigabit Ethernet switching module (WS-X4424-GB-RJ45) • 48-port Gigabit Ethernet switching module (WS-X4448-GB-LX) • 48-port 10/100/1000BASE-TX Gigabit Ethernet switching module (WS-X4448-GB-RJ45) • 24-port IEEE 802.3af-compliant PoE 10/100/1000 BASE-T RJ-45 switching module (WS-X4524-GB-RJ45V)[7] • 48-port 10/100/1000BASE-T Gigabit Ethernet switching module (WS-X4548-GB-RJ45) • 48-port Gigabit Ethernet switching module (WS-X4448-GB-SFP) • 48-port IEEE 802.3af-compliant PoE 10/100/1000 BASE-T RJ-45 switching module (WS-X4548-GB-RJ45V)[7] • Access Gateway Module (WS-X4604-GWY)

1. VTP = VLAN Trunking Protocol
2. PAgP = Port Aggregation Protocol
3. CLI = command-line interface
4. RMON = Remote Monitoring
5. CDP = Cisco Discovery Protocol
6. CGMP = Cisco Group Management Protocol
7. This module only supports data on the Catalyst 4003.

Catalyst 4006 Switch Features

The Catalyst 4006 switch (see Figure 1-2) is a six-slot switch designed for high-performance, high-density wiring closet applications.

Figure 1-2 Catalyst 4006 Switch (Front View)



The Catalyst 4006 switch has two Gigabit Ethernet ports and a 32-Gbps, nonblocking, full-duplex switching fabric that provides connections between the supervisor engine and the switching modules. The Gigabit Ethernet ports can be configured with any combination of shortwave SX, LX/LH, and ZX GBICs. For a description of GBICs, refer to the *Catalyst 4500 Series Module Installation Guide*.

The Catalyst 4006 chassis has six slots for online-swappable modules. Slot 1 is reserved for the supervisor engine, which provides switching, local and remote management, and switch-status monitoring. The Catalyst 4006 switch supports the Supervisor Engine II, III, or IV. Slots 2 through 6 are available for switching modules.

Table 1-2 describes the features of the Catalyst 4006 switch.

Table 1-2 Features of the Catalyst 4006 Switch

Feature	Description
Ethernet speeds	• Ethernet (10BASE-T) interface to workstations and repeaters • Fast Ethernet (100BASE-T) interface to workstations, servers, switches, and routers **Note** Autonegotiation of link speed on each 10/100 port allows migration to 100BASE-T from a 10BASE-T installed base.
Standard equipment	• Six-slot modular chassis with one slot reserved for a supervisor engine and five slots for switching modules • Three power supply bays that support two required and one optional redundant AC-input power supply • One hot-swappable fan assembly
Standard management and support	• Supports Layer 2 forwarding with an aggregate forwarding rate of 18 million pps • Supports 16,000 MAC addresses per system • Supports up to 1,024 VLANs with IEEE 802.1Q VLAN tagging on all ports and support for VTP[1] • Supports port aggregation using PAgP[2] for 100-Mbps and 1000-Mbps EtherChannel
Software management	• CLI[3] and SNMP interfaces consistent with Catalyst 6500 series switches • Out-of-band management (SNMP, Telnet client, and TFTP) through the 10/100BASE-T management port on the supervisor engine • RMON[4] with RMON 1 • Standard Layer 2 features: – 802.1D Spanning Tree Protocol – CDP[5] – VTP version 2 with pruning extensions – CGMP[6] client

Table 1-2 Features of the Catalyst 4006 Switch (continued)

Feature	Description
Embedded management	• Full SNMP implementation, including entity-MIB, all relevant standard MIBs, and all relevant Cisco MIBs • The first four RMON groups (Ethernet statistics, Alarms, Events, and History) on a per-port basis without an optional RMON processing module • SPAN, allowing you to redirect traffic from any port or VLAN to a SPAN destination port • Performance management information
Power supplies	• Three 400 W, 12 V output, hot-swappable, load-sharing power supplies with AC power factor correctionOptional 400 W, 12 V output DC power supplies • Optional 650 W, 12 V output DC power supplies
Supervisor engine	• Supports the Supervisor Engine II (WS-X4013), Supervisor Engine III (WS-X4014), and Supervisor Engine IV (WS-X4515) • Data path and control for all network interfaces with Ethernet management and console ports • Interface monitoring, environmental status, and SNMP and console/Telnet interface **Note** Packets are not forwarded while the supervisor engine is removed; a system reboot occurs when a supervisor engine is reinserted. • 32-port full-duplex Gigabit Ethernet switching engine • Two Gigabit Ethernet (1000BASE-X) interfaces for backbone interconnection of high-performance switches and routers

Table 1-2 Features of the Catalyst 4006 Switch (continued)

Feature	Description
Supported switching modules	• Backplane channel module (WS-X4019) • 24-port Fast Ethernet switching module (WS-X4124-RJ45) • 24-port 100BASE-FX Fast Ethernet switching module (WS-X4124-FX-MT) • 48-port 100BASE-FX Fast Ethernet switching module (WS-X4148-FX-MT) • 48-port 10/100-Mbps Fast Ethernet switching module (WS-X4148-RJ) • 48-port 100BASE-BX10-D Fast Ethernet switching module (WS-X4148-FE-BD-LC) • 48-port 100BASE-LX10 Fast Ethernet switching module (WS-X4148-FE-LX-MT) • 48-port 10/100-Mbps Fast Ethernet switching module (WS-X4148-RJ21) • 48-port Cisco pre-standard Power over Ethernet (PoE) 10/100BASE-TX switching module (WS-X4148-RJ45V) • 24-port IEEE 802.3af-compliant PoE 10/100BASE-TX switching module (WS-X4224-RJ45V) • 48-port IEEE 802.3af-compliant PoE 10/100BASE-TX RJ-21 switching module (WS-X4248-RJ21V) • 48-port IEEE 802.3af-compliant PoE 10/100BASE-TX switching module (WS-X4248-RJ45V) • 32-port 10/100-Mbps Fast Ethernet plus 2-port Gigabit Ethernet switching module (WS-X4232-GB-RJ) • 32-port 10/100-Mbps plus 2-port 1000BASE-X Layer 3 Ethernet routing module (WS-X4232-L3) • 32-port 10/100-Mbps Fast Ethernet switching module with modular uplink support (WS-X4232-RJ-XX) – 4-port 100BASE-FX MT-RJ uplink module (WS-X4504-FX-MT) (optional)

Table 1-2 Features of the Catalyst 4006 Switch (continued)

Feature	Description
Supported switching modules (continued)	• 2-port Gigabit Ethernet switching module (WS-X4302-GB) • 6-port 1000BASE-X Gigabit Ethernet switching module (WS-X4306-GB) • 12-port 1000BASE-TX plus 2-port 1000BASE-X Gigabit Ethernet switching module (WS-X4412-2GB-T) • 18-port Gigabit Ethernet switching module (WS-X4418-GB) • 24-port 10/100/1000BASE-T Gigabit Ethernet switching module (WS-X4424-GB-RJ45) • 48-port Gigabit Ethernet switching module (WS-X4448-GB-LX) • 48-port 10/100/1000BASE-TX Gigabit Ethernet switching module (WS-X4448-GB-RJ45) • 24-port IEEE 802.3af-compliant PoE 10/100/1000 BASE-T RJ-45 switching module (WS-X4524-GB-RJ45V) • 48-port 10/100/1000BASE-T Gigabit Ethernet switching module (WS-X4548-GB-RJ45) • 48-port Gigabit Ethernet switching module (WS-X4448-GB-SFP) • 48-port IEEE 802.3af-compliant PoE 10/100/1000 BASE-T RJ-45 switching module (WS-X4548-GB-RJ45V) • Access Gateway Module (WS-X4604-GWY)

1. VTP = VLAN Trunking Protocol
2. PAgP = Port Aggregation Protocol
3. CLI = command-line interface
4. RMON = Remote Monitoring
5. CDP = Cisco Discovery Protocol
6. CGMP = Cisco Group Management Protocol

Switch Components

The following components are standard on the Catalyst 4003 switch:

- Fan assembly: fan tray and two fans
- One Supervisor Engine I
- One AC-input power supply

The following components are available as options for the Catalyst 4003 switch:

- One additional AC-input power supply for redundancy
- Up to two switching modules
- One or more DC-input power supplies for redundancy

The following components are standard on the Catalyst 4006 switch:

- Fan assembly: fan tray and four fans
- One Supervisor Engine II
- Two AC-input power supplies

The following components are available as options for the Catalyst 4006 switch:

- One additional AC-input power supply for redundancy
- Up to five switching modules
- One or more DC-input power supplies for redundancy

Fan Assembly

Note For complete environmental specifications, including airflow requirements, see Appendix A, "Specifications."

The system fan assembly provides cooling air for the internal chassis components. The fan assembly is a tray of fans that you can insert and remove from the chassis while the system is on line. The Catalyst 4003 switch fan assembly has two fans, and the Catalyst 4006 switch has four fans. The fans exhaust air from one side and draw in fresh air on the other side. Catalyst 4003 switch airflow is shown in Figure 1-3. Catalyst 4006 switch airflow is shown in Figure 1-4.

Caution You must install module filler plates on unused switching module slots to ensure proper airflow.

Figure 1-3 Catalyst 4003 Airflow

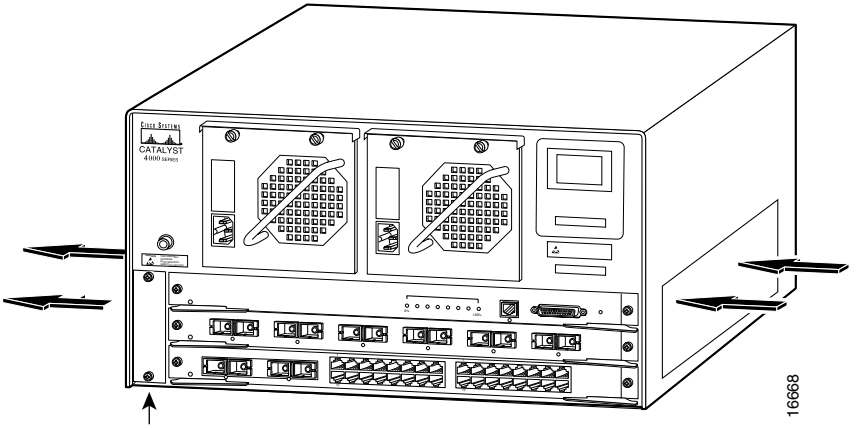
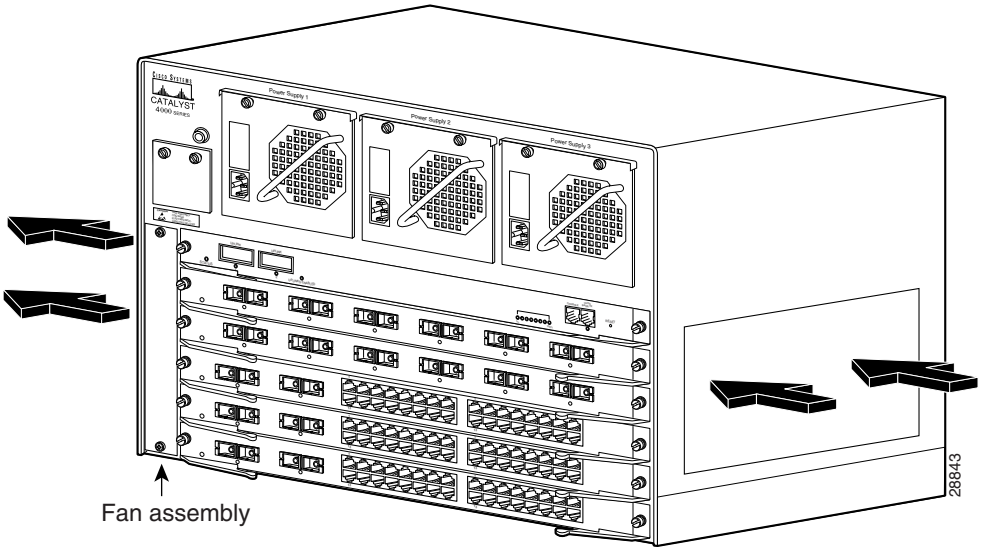


Figure 1-4 Catalyst 4006 Airflow



If one fan on the tray fails, the other fans continue to run. A sensor on the supervisor engine monitors internal air temperature. If the air temperature exceeds a specified threshold, the environmental monitor displays warning messages. Threshold and status level descriptions are provided in the "Power Supplies" section.

To replace a fan assembly, see Chapter 4, "Removing and Replacing FRUs."

Note For complete power specifications, see Appendix A, "Specifications."

Power Supplies

The Catalyst 4000 series switches can use a 400 W AC-input power supply (see Figure 1-5), a 400 W DC-input power supply (see Figure 1-6), or a 650 W DC-input power supply (see Figure 1-7). The AC-input power supply has a power cord that connects each power supply to the site power source. The DC-input power supplies are equipped with a compression-style input terminal block that is directly connected to the site power wiring.

The power supply does not have a power switch. Power is provided when the power cord and wiring are installed and plugged into an electrical outlet and the unit is fully seated in the system chassis.

Figure 1-5 400 W AC-Input Power Supply

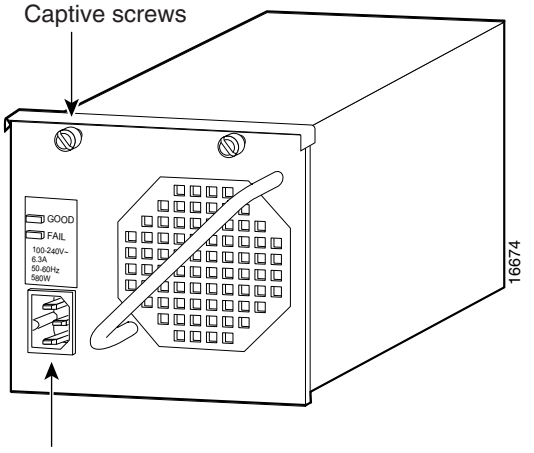


Figure 1-6 400 W DC-Input Power Supply

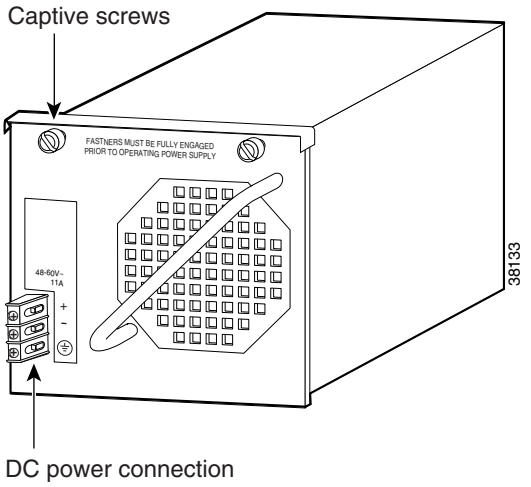
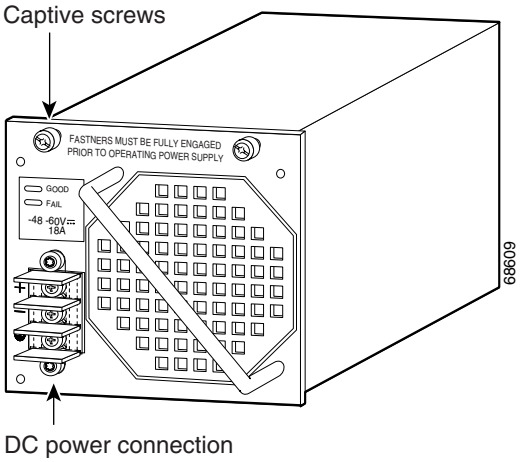


Figure 1-7 650 W DC-Input Power Supply



Catalyst 4000 series switches support redundant power supplies. Each power supply has an individual power cord and status LEDs. The Catalyst 4003 switch has one standard power supply and an optional redundant power supply. The

Catalyst 4006 switch has two standard power supplies and one optional redundant power supply. Two standard power supplies are required to operate a Catalyst 4006 switch. Systems with three power supplies will share the load with each unit providing approximately one-third of the total load.

When power is removed from one power supply on a Catalyst 4003 switch that has two power supplies, the redundant power feature causes the second power supply to produce full power.

When power is removed from one power supply on a Catalyst 4006 switch that has three power supplies, the other two power supplies produce full power. Load sharing returns when all three power supplies are on.

To replace a power supply, see the "Removing and Replacing the Power Supply" section on page 4-2.

Power Supply LEDs

The AC power supply has two front-panel LEDs:

- The LED labeled GOOD is green when the power supply is connected and operating normally.
- The LED labeled FAIL is red when there is a problem with the power supply.

Power Supply Fan

Each power supply has a built-in fan. Air enters the front of the power supply (power-input end) and exits through the back. An air dam keeps the airflow separate from the rest of the chassis, which is cooled by the system fan assembly.

Load-Sharing Feature

When you install and power-on a second power supply on a Catalyst 4003 switch, it provides approximately half of the required power to the system. If one power supply fails, the other power supply immediately assumes full power to maintain uninterrupted system operation.

When you install and turn on a third power supply on a Catalyst 4006 switch, it provides approximately one-third of the power required by the system. If one power supply fails, the other two immediately generate full power to maintain uninterrupted system operation.

When you install a redundant power supply, load sharing and fault tolerance are enabled automatically; no additional software configuration is required.

Environmental Monitoring Feature

With the environmental monitoring and reporting feature, you can keep your system running by resolving adverse environmental conditions before loss of operation. The power supply monitors its own internal temperature and voltages. In the event of excessive internal temperature, the power supply shuts down to prevent damage. When the power supply returns to a safe operating temperature, it restarts. If the power supply output voltage is abnormal, the LED labeled OUTPUT FAIL will light. An instance of substantial input overvoltage can shut down the power supply.

The supervisor engine monitors the status of each power supply and provides a status report through the switch software. For more information on how the supervisor engine monitors the power supplies, refer to the *Catalyst 4500 Series Module Installation Guide*.

External Power Shelf

The Catalyst 4006 external power shelf contains up to three single-phase, AC-DC, 1050 W, –52 V output power supplies, which can provide Power over Ethernet to enabled switching modules when used with the power entry module.